Fall 11-1925

Volume 35 - Issue 2 - November, 1925

Rose Technic Staff
Rose-Hulman Institute of Technology

ROSE TECANIC

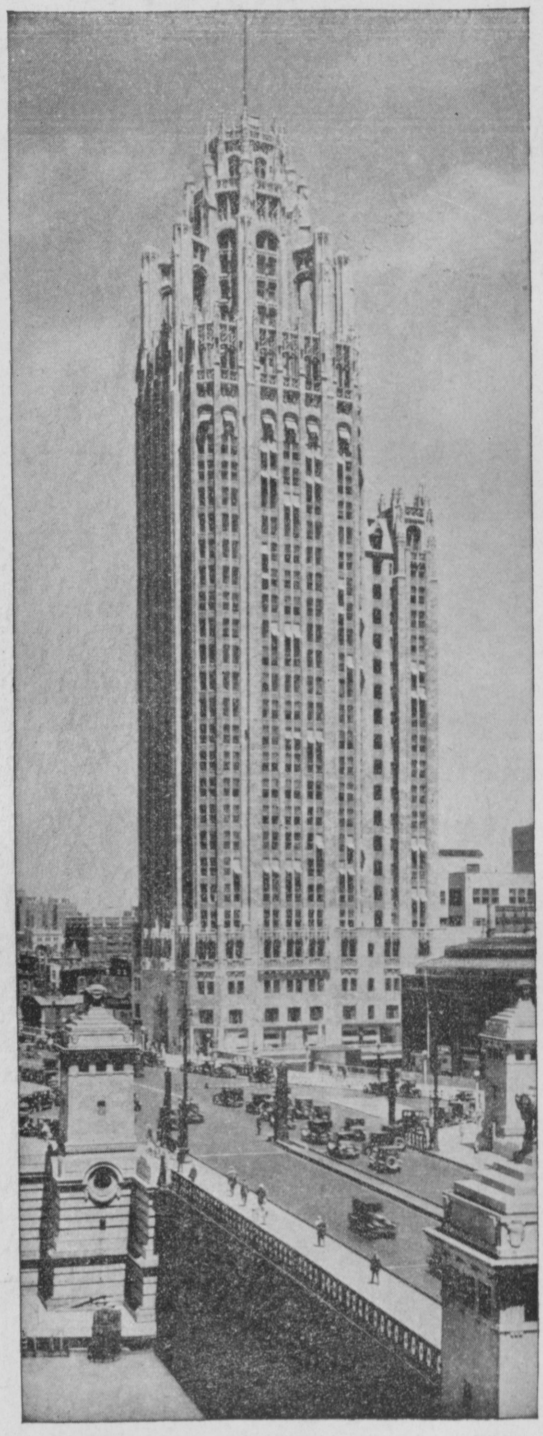
VOL. XXXV NOVEMBER, 1925 No. 2

Member of Engineering College Magazines Associated

A Lesson in Psychology

AN OLD CHIEF of the Pueblo Indians, on his first visit to Chicago, was taken to the top of the new Tribune Tower Building. On leaving the elevator, he turned to his guide and asked, "When are we going up?" When he was told that he was already on the top floor, the old man declared flatly that he did not believe it, because he had climbed no ladders;—nor could he be persuaded until he looked over the city spread out beneath him.

It's all a matter of association. The Chief had always associated the idea of "going up" with the ladders of a Pueblo. In a similar fashion, to people in modern cities the world over, the idea of ascent is inextricably bound up with the name of Otis.



THE CHICAGO TRIBUNE BUILDING *is equipped with nine (9) Otis Elevators, traveling at a speed of 800 F. P. M., and operating with signal control, which is entirely automatic in operation and independent of the operator. This is the newest and most improved operation for intensive elevator service in high buildings.*

OTIS ELEVATOR COMPANY

Offices in all Principal Cities of the World

XXXV TERRE HAUTE, INDIANA, NOVEMBER, 1925 No. 2

THE TECHNIC

Member of Engineering College Magazines Associated

A monthly magazine published eight times from October to May, inclusive by
THE STUDENT BODY AND ALUMNI OF ROSE POLYTECHNIC INSTITUTE

STAFF

Supscription, per year, $2.00
Address all communications to THE ROSE TECHNIC, Terre Haute, Indiana.
Entered in the Post-office at Terre Haute as second-class matter, as a monthly during the school year, under the Act of March 3, 1879.
Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized December 13, 1918.

Summary of Contents

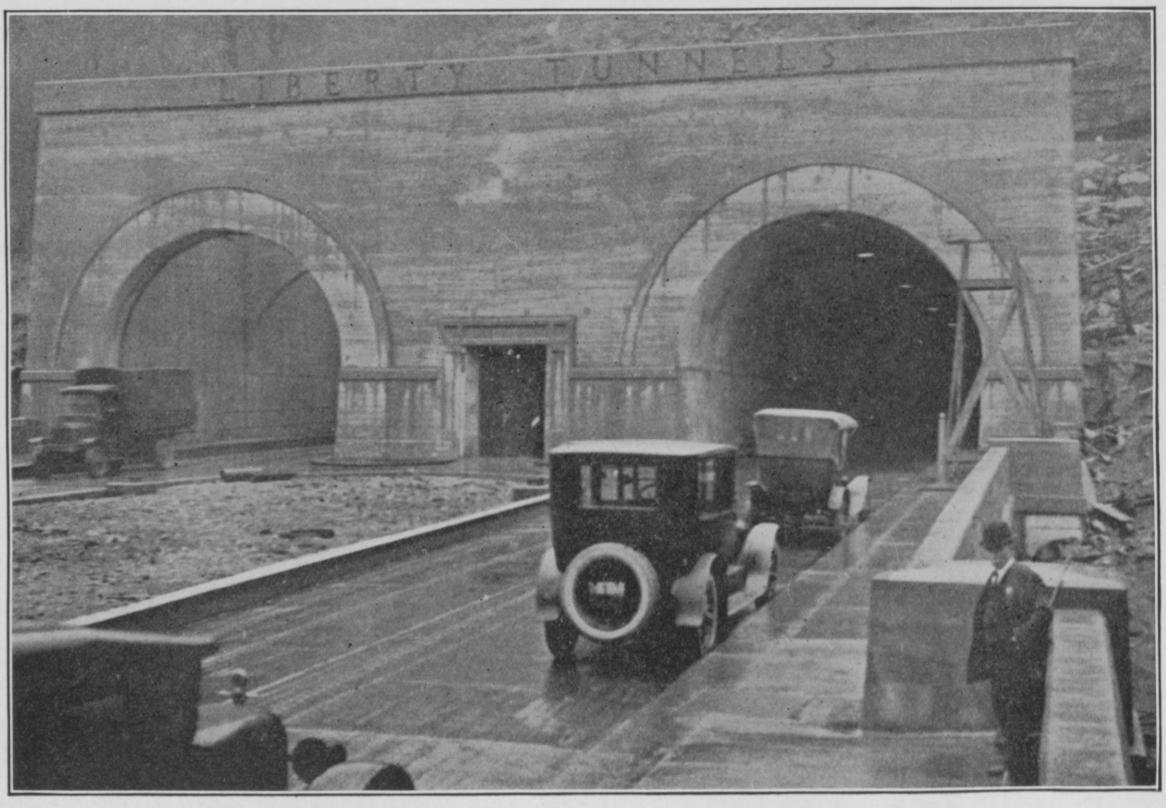


FIG. 1—DOWN-TOWN ENTRANCE TO LIBERTY TUNNEL

The tubes are 59 ft. between center lines. Each tube is 20 ft. high above the roadway and 26 ft. wide at the curb line.

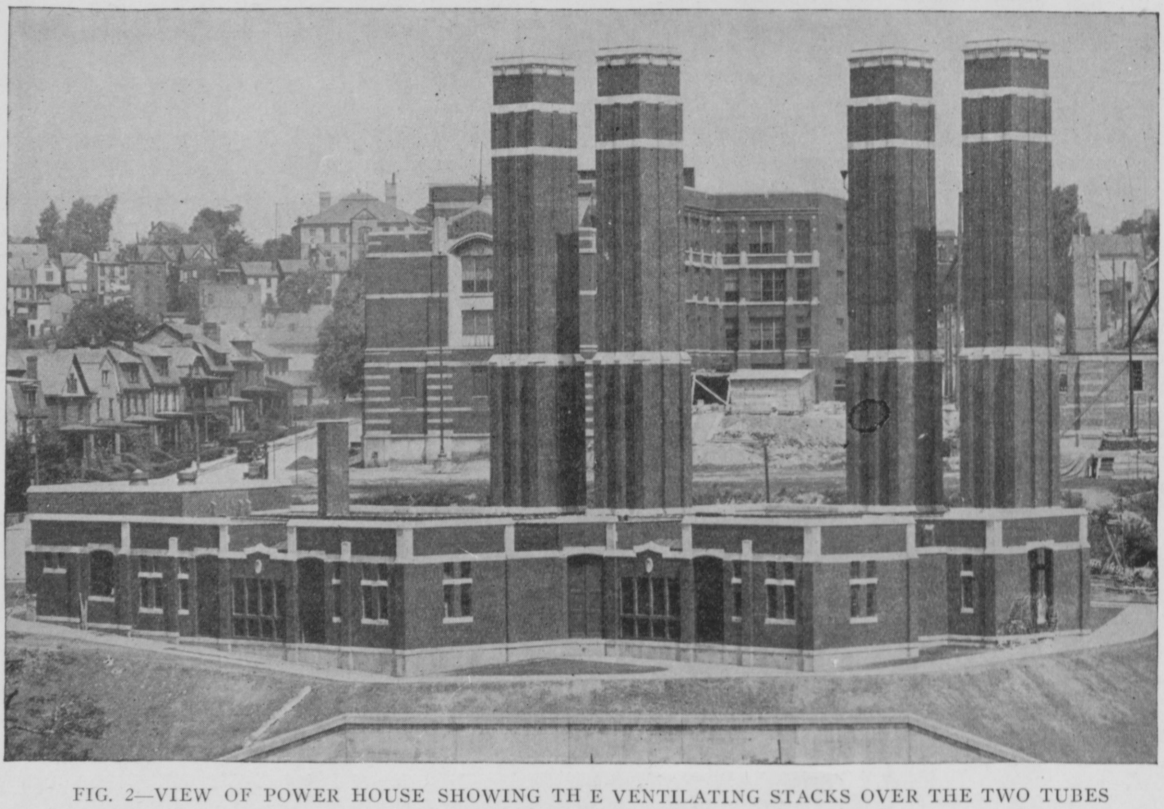


FIG. 2—VIEW OF POWER HOUSE SHOWING TH E VENTILATING STACKS OVER THE TWO TUBES

The stacks are 10 ft. square and 110 ft. high. South Hills High School is in the background.

VENTILATING THE NEW LIBERTY TUNNEL IN PITTSBURG

By Arthur McGonagle

Consulting Engineer, Pittsburg, Penn.

By courtesy of the Electric Journal and Westinghouse Electric and Manufacturing Co.

IT IS not every power company that can secure a twenty-four-hour-a-day load from the operation of a vehicular tunnel. The problems involved in the construction of this tunnel, and of a similar one under construction at New York City, are so unprecedented as to arouse a great deal of interest among engineers. The main engineering problem involved is that of securing adequate ventilation in long tubes filled with motor vehicles emitting exhaust gases. In such cases as the New York Central Railroad entrance into New York City, the introduction of electric locomotives obviated the necessity of special ventilating schemes, when conditions become obnoxious, due to the use of steam locomotives. Numerous other tunnels and subways have since been built and put into operation with electric service, but the Pittsburg tnuuel is the first real tryout in this country of a long tunnel for the use of automobiles.

In Pittsburgh, the rivers and hills present many problems which are not common to other cities. The main business district is confined to a small triangular section bounded on one side by the Allegheny River and on the other side by the Monogahela River. Beyond the latter river, the surface rises abruptly so that there is little room for development. Beyond this hill is a section suitable for a residential district, but to reach this has been difficult. The opening of the Liberty Tunnel brought this South Side region to within a few minutes ride from the business section. The past year has seen more building in the South Hills than in any other section of the Pittsburgh district.

There are two tubes, one for traffic in each direction. The alignment is straight with a slight grade from the down-town up to the suburban end. The tunnel is 5888 feet long from portal to portal. At the middle of the tunnel two shafts rise 190 feet to the surface where are located the fans and electrical equipment. Each shaft it partitioned into exhaust and supply ducts.

System of Ventilation

The direction of the air in the tubes is always with the traffic. Half of each tube from entrance to mid-length is ventilated by exhaust fans bringing fresh air from the entrance. At mid-length there is a large opening across the top of the tube through which the air is exhausted by fans at the surface above this point.

A short distance beyond the exhaust shaft a forced draft of incoming air is brought in from the pressure fans. The air supply ducts are turned forward in the direction of traffic alongside the tunnel and terminate in vertical slots in the side walls. The ducts are shaped to form nozzels directed at an angle of 2½ in 12 toward the axis of the tunnel in the direction of traffic. Inspection of the section between uptake and the supply nozzles indicates that there is no short-circuiting of the air path.

At each end of the tunnel a special construction has been used to provide a wind break to prevent obstruction of the outgoing ventilating currents by winds. It consists of a wind trap formed by extending the tunnel some 75 feet beyond the face of the hill side and building two large openings in the roof of this extension, with side walls carried up high enough to form, in effect, low up-casts or stacks. The out-going ventilating current can pass upward to the open air and at the same time an opposing current of wind from the outside entering the tunnel portal can pass up the first stack when it is deflected by meeting the ventilating current.

Extensive experiments were made in connection with the Bureau of Mines to determine the allowable amount of air pollution which would not be deleterious to those passing through the tunnel.

Table I shows the results of an elaborate series of experiments made by the Bureau of Mines to determine the amount of carbon monoxide gas produced by motor vehicles of different types under various operating conditions.

Professor Henderson made an exhaustive investigation at New Haven to determine the effect on the human body of breathing air containing various proportions of carbon monoxide gas. Based on these tests on a large number of persons, it was determined that no harmful effects resulted from breathing for a period of one hour, air containing six parts out of 10 000 of CO gas. Other tests resulted in the assumption that the average motor car discharges 1.5 cu. ft. of CO per minute.

On this basis it was determined that each vehicle in the tunnel requires a fresh air supply of 2500 cu. ft. per minute. The assumed number of cars in each tube under full normal traffic conditions was taken as 114. Hence the total fresh air supply required on this basis was taken to be 280 000 cu. ft. for each tube.

TABLE I—CARBON MONOXIDE PRODUCED BY VARIOUS CLASSES OF AUTOMOBILES AND TRUCKS

Loaded to one-half capacity and running on level grade. Cubic feet of carbon monoxide per hour at 65 deg. F.,

		29.92" Hg.					
5 Passenger	65	35	36	..	46	61	73
7 passenger	105	33	53	..	76	112	137
Trucks up to 1-½ tons	68	31	47	..	60	77	94
Trucks 1-½ to 3 tons	56	13	..	68	104	104	..
Trucks 3-½ to 4 tons	158	66	..	92	147	131	..
Trucks 5 tons.....	105	60	..	110	152	..	..

This amount was made the minimum to be supplied to each tube. As each tube is served by two exhaust fans and two blowing fans, this duty was divided equally between the four fans and the minimum duty of each fan was fixed at 70 000 cu. ft. per minute.

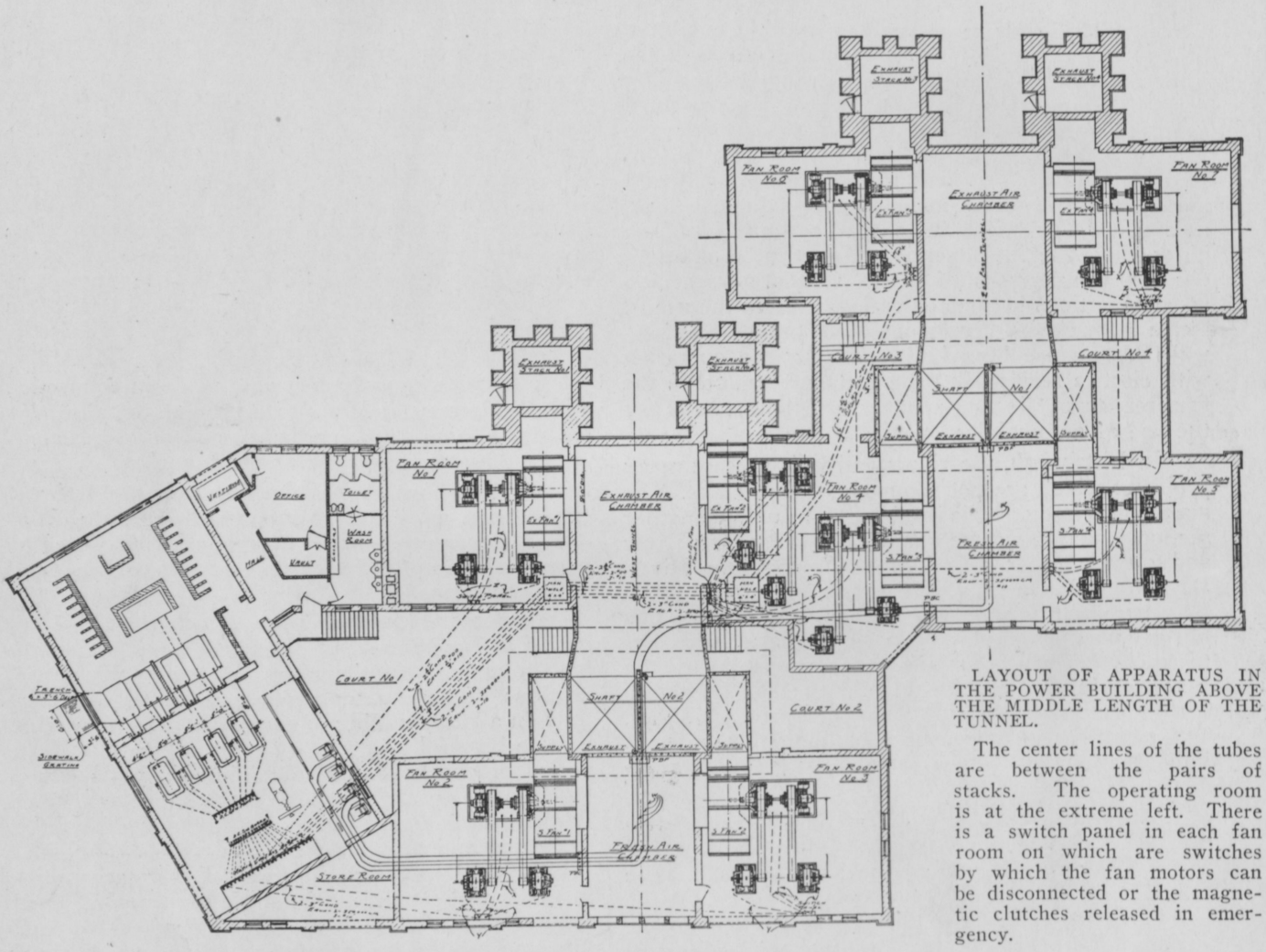
In order to take care of increase in traffic due to rush hour periods, etc., the fans were designed to give an increase in output due to increase in speed which would bring their delivery up to 140 000 cu. ft. per minute each or a total for each tube of 560 000 cu. ft. per minute. Speed regulation is provided for the motors which allows the fans to be operated at any point between these two limits in accordance with traffic requirements.

As a further precaution and in order to take care of traffic jams or a fire in the tunnel, the speed of the fans can be increased 25 pre cent beyond the above mentioned maximum which brings their capacity to 175 000 cu. ft. per minute, which amount, on account of the ejector effect of the air nozzles in the side walls of the tunnels causes an air movement of over 1 000 000 cu. ft. of air per minute through each tube.

In order to provide for the wide speed regulation necessary to meet the above continuous operating conditions, it was decided to use direct-current motors to drive the fans. As the only power supply available was alternating current, transformer and converter equipment was installed to furnish a direct-current supply.

Careful calculations, checked as far as possible by experiment to determine the loss in air pressure due to friction in air ducts, nozzles, etc., together with the energy absorbed by the induced current, determined the ratings of the fans to be as follow:—Supply fans 140 000 cu. ft. per minute at 1.7 in. static pressure, at 140 r.p.m. Exhaust fans 140 000 cu. ft. per minute at 0.62 in. static pressure, at 90 r.p.m. Each fan consists of a multi-blade wheel 115 in. long by 54 in. wide. Each fan shaft carries two clutch-connected belt pulleys for drive by either or both of two motors. The power required to operate the fans under these conditions was 85 hp for each supply fan and 40 hp for each exhaust fan.

As the power required to drive apparatus of this type increases as the cube of the speed, the power required for the 25 percent excess speed was almost double (1.96 times) that required for the rated speed and capacity. This condition was met by providing two 85 hp motors for each supply fan and two 40 hp motors for each exhaust fan. This arrangement allows the fans to be operated under all normal requirements of traffic conditions with one motor and provides a spare motor ready to operate at all times. When necessary, two motors can be used to drive each fan at 25 percent excess speed. The method of control used to accomplish this is described later in this article.



LAYOUT OF APPARATUS IN THE POWER BUILDING ABOVE THE MIDDLE LENGTH OF THE TUNNEL.

The center lines of the tubes are between the pairs of stacks. The operating room is at the extreme left. There is a switch panel in each fan room on which are switches by which the fan motors can be disconnected or the magnetic clutches released in emergency.

Electric Power Supply

Current for operation of fans, lighting, etc. is obtained from several sources. One 11 000 volt line from Brunots Island Station and a second from Colfax Station of the Duquesne Light Company supply current for power and for lighting. A third 2200 volt line from the Warrington Avenue substation is an

emergency supply for lighting the tunnels and another 110-220 volt single-phase emergency circuit is available for station lighting.

There are eight fans and each fan is connected by a magnetic clutch with two direct-current motors. All the fan motors and magnetic clutches are controlled from a switchboard in the converter room. There is a carbon monoxide graphic recorder installed which traces a continuous record of carbon monoxide percentage in the tunnel. This is used as a guide to the operators of the fans.

There are four three-phase transformers serving two 200 kw, and two 300 kw. 220 volt, six-phase rotary converters supplying current for the fan motors. The transformers are double coil so that 22 000 volt service can be used in the future if desired. A fifth three-phase connection is taken off to supply current to two 55 kv-a single-phase transformers connected in open delta to supply the 2200 volt switchboard. To this switchboard is connected the tunnel lighting system

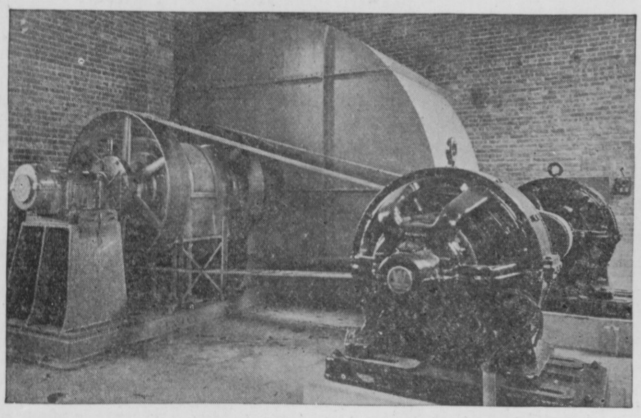


FIG. 5—ONE OF THE VENTILATING FANS WITH DOUBLE-MOTOR DRIVE AND MAGNETIC CLUTCH CONTROL

and a connection to three 10 kv-a single-phase transformers which furnish energy for a 220 volt, three-phase supply for operating the flywheel motor-generator set and the air compressor. The latter supplies compressed air for cleaning all electrical devices including the fan motors. The flywheel motor-generator set is an auxiliary source of direct-current for operating the oil circuit breakers. It is designed so that it will keep running and supply current for operating the circuit breakers for at least five minutes after the power supply has failed.

The electrically-operated circuit breakers are supplied with operating current from the direct-current end of the rotary converters. This supply is cross-connected with the output of the motor-generator set by means of an automatic throw-over switch so arranged that, when the power supply from the rotary converters fails, this switch automatically connects the operating circuits of all circuit breakers with the motor-generator set.

Each 11 000 volt service and each 11 000 volt connection to the transformers serving the rotary converters is controlled by a three-pole automatic oil circuit breaker with overload and no-voltage release. These circuit breakers are mounted in brick cells, on top of which is an angle frame structure which supports the tripping coils and disconnecting switches. The high tension wiring is carried on pillar insulators mounted on this frame structure.

The transformer circuit breakers are interlocked with the manually-operated circuit breakers on the direct-current ends of the rotary converters so that, if a certain circuit breaker trips on one end of a rotary converter, the circuit breaker on the other end is opened also.

A pit three feet deep and six feet wide is formed in the floor of the transformer room and extends under all transformers. This pit is connected to a fresh air opening in the side of the building and supplies air for ventilation around the transformers. Roof ventilators are placed over the transformers to assist with this ventilation. The pit also serves as a catch basin for any oil which might overflow from the transformers in case of fire. A brick wall is built from floor to ceiling and so placed that, in the event of fire occuring, only two of the four transformers would be affected.

The two service circuit breakers are tied together by overhead buses which are connected by an electrically-operated non-automatic oil circuit breaker mounted in brick cells and arranged so that by opening either of the main circuit breakers and this tie circuit breaker, half of the high tension apparatus can be disconnected for cleaning and maintenance while the other half is in operation.

The connection to the 220 volt switchboard and the emergency supply connection to this board are each controlled by a manually-operated oil circuit breaker. These circuit breakers are mechanically interlocked so that when one is open the other is closed.

The control switchboards in the operating room are arranged in units, one for the alternating-current control, one for the direct-current end of the rotary converters, and one for fan motors, also one for lighting and detail service. The alternating-current control panels carry the usual switching and instrument equipment for this class of service. Near the middle

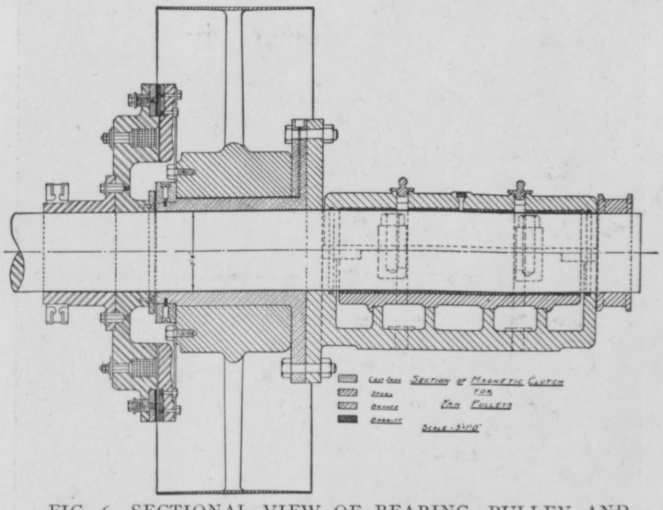


FIG. 6—SECTIONAL VIEW OF BEARING, PULLEY AND *MAGNETIC CLUTCH*

of the room are the direct-current panels with corresponding control and indicating equipment. Back of this switchboard is the motor control switchboard. This consists of eight panels, one for each fan and two motors comprising a fan unit. Each unit consists of two multiple-switch type motor starters capable of bringing the motors to normal full speed. Two hand-operated field rheostats are mounted on each panel capable of bringing the motors to double speed. At this speed the fan will absorb the full capacity of one motor. There are also two concentric rheostats mechanically connected, capable of bringing both

(Continued on Page 22)

SUPER VISION

Alumni Address at Rose Polytechnic June, 1925

By Frederick W. Hild '17

Assistant Manager National Lamp Works, General Electric Company

ACCORDING to George Ade, this is the time of year when the College Senior starts to launch on the Tempestuous Sea, hike up the Toilsome Mountainside, go into The waiting Harvest Fields, and get a death grip on the Ladder of Fame all at one and the same time—truly a comprehensive undertaking. Such an undertaking necessarily requires Optimism, but, fortunately, in the Wisdom of Providence, Optimism is a heritage of Youth. We should rejoice in this.

Whenever I think of the optimism of Youth, I always think of an expression by the Class of 1916, an expression which crystallized itself into the following lines: "Although some of us may be hanged, and some of us may go to the "pen", we are positively sure that the most of us will live to be famous men!" That is real optimism. Optimism and Enthusiasm are brothers. With an appreciation of this we can better evaluate the importance of optimism, since nothing truly great has ever been produced or will ever be produced without enthusiasm.

Elbert Hubbard said, "I pray not so much that I may be good as that I may be Radiant!" And, if I may pause a moment to pay tribute to Dr. Johonnott, I am sure that all those who really knew and loved him were drawn to him by his enthusiasm—an enthusiasm which was great enough to embrace small tasks as well as large, and routine weary work as well as bigger things. He was a great inspiration. He remains a great inspiration.

Now, all of us young men are endowed by the grace of nature with enthusiasm. We are to be envied, and you are to be particularly envied not only because of that, but because you are now standing on the threshold of things. You, now, are at your constructive beginnings. And in that connection, there comes to me a rather appropriate paragraph which we printed in the Technic some ten years ago. We picked it up in our exchanges. I regret to say I don't know who wrote it or where it came from. It was headed "The Freshman." and as nearly as I can remember, it ran something as follows:

"Off comes our cap to the newest man upon the green. Pride of the morning, heir to the coming day, unscarred by the wreck of years, who does not envy, admire, salute him? Behind him, hearthstone memories, tender ministries, fairest dreams. Before him, honest work, honored name, mighty years—years that crown and uncrown kings and queens. Days of Youth be kind to him. Powers that be, look well to him. Ye that know how, plead aye for him. God of our boys, make a man of him!"

I am immeasurably glad to have the privilege of being here this morning and talking with you. I want to talk, not with the thought of being able to tell you how to attain success and how to achieve fame. I will grant you that it is not such an extremely difficult task to do that for it is comparatively easy to offer advice of a kind. Our papers and magazines are filled with it, and I imagine they do not pay the people who write such advice a great deal of actual money. Any of you can enroll tomorrow in ten or twenty different mail order courses which are absolutely guaranteed to show you the way to certain success and prosperity. But I have a very reactionary and old fashioned idea that one should not attempt such things without actually having won the right through real achievement. It is therefore forbidden me to use that as a subject. We can, I think, with confidence and respect leave a discussion of that sort to Dr. Moran, who has achieved, and who is indeed well qualified to give advice if he chooses to do so. However, I want to talk to you simply as a young man speaking to young men. I know my viewpoint is somewhat different than yours, for every man possesses a viewpoint distinctly his own, but I feel that my viewpoint is much more nearly like yours than it would be were I thirty years older than I am.

I feel that I am about the same general type of individual that each of you are. The only big difference between you and me is that I have had eight more years of **opportunity.** The only thing I can do, therefore, is to tell you—uot advise you—tell you of some of the things which I **think** I have in those years found to be true. Assuming they are true, then you too will sooner or later discover these same truths for yourselves.

As engineers, all of you are going to be directly or indirectly interest in manufacturing. All of my limited experience has had to do with manufacturing, and I think I had best keep on familiar ground. In the first place, manufacturing is almost entirely a matter of supervision, and supervision is nothing more or nothing less than knowing the right way to do any particular job and the doing it that way —rather, getting it done that way. Supervision divides itself logically into two divisions which we can call Engineering Supervision and Personnel Supervision. These two branches are Siamese twins. Separate one from the other and you court disaster. Engineering supervison without personal supervison is rldiculous. Personal supervision without engineering supervison is futile. Perhaps, I should tell you what I mean by engineering supervison and personal supervison.

Engineering supervision has to do with the discovery, knowledge of, application and use of right methods. Engineering supervision has the responsibility of developing and maintaining operations and processes which are fundamentally, basicly and technically **right!** For instance, in our business we work with glass. One of our biggest problems is material losses. We call it breakage. The majority of our breakage arises from glass strain—strain which is know that there are three ways by which we can eliminate or reduce strain. First, we may work our glass slowly. Heat it slowly and cool it slowly. But that costs too much. Labor cost will not permit of that method. Second, we may change our constructions so that contours are right and unequal heating and cooling is minimized. That is impracticable. It is like trying to build a locomotive out of corrugated strawboard. It can't be done practically. Third, we may work our glass fast, use practical shapes and constructions, let the strains occur and then relieve those staains by annealing. We have just installed a 50 kw annealing furnace. Our preliminary tests show that our material losses will be halved. That is Engineering Supervision.

Now regardless of haw perfect technical methods may be planned and developed, if those methods are not properly adhered to, if they are performed carelessly by the operatives, if they are improperly executed, good results are impossible of attainment. This is, in part, where personal supervision has its function. Personal supervision has to do with the human element. I think it is composed of just two things—human understanding and hard work. It may interest you to know what a famous French psychologist said were the three most effective ways by which human conduct could be influenced. "They were," he said, "Affirmation, Repetition and Mental Contagion." That is, first a positive attitude, a positive program, and a positive statement of that program. Second, constant, continual, unending repetition of that positive attitude; repetitive teaching, repetitive correction where necessary, repetitive encouragement, and repetitive application that is where the hard work comes in.

You have all heard the stands at a football game chant for a touchdown, haven't you? Well, that is one application of the two principles of affirmation and repetition. Come to think of it, the third principle is also involved here because mental contagion is just a high sounding name for enthusiasm.

I am uot a psychologist, but I know that this psychologist knew whereof he spoke. I'll tell you why. Four years ago, it became necessary for us to improve the quality of our product. We proceeded with a program which was based on those three principles. We considered it a very interesting experiment, and the most interesting thing about it

(Continued on page 24)

DUPLEX AUTOMATIC HIGH FREQUENCY COMMUNICATION

By C. N. Cutler '27

ONE of the latest developments of the radio art is that of carrier current communication in which telephony is conducted along the same wires used for the transmission of high power. The messages sent are confined to a path where the high frequency carrier waves travel, and are not broadcast in space as is done in ordinary radio communication.

It is with the idea of describing the carrier current telephony as applied to power system load despatching now in use by the Central Indiana Power Company subsidiaries, and more particularly the Dresser power plant system that this article is written.

In order to fully understand the merits of carrier current telephony above those of other forms of communication, where there is involved high frequency waves, we shall separate the conveying of sounds over great distances into four classes.

1. Physical telephone wires installed on the same poles as the transmission line conductors.

The greatest advantages in this method are simplicity, and the permitting of cut in's by the repair crew along the line to keep in constant touch with the power plants. On the other hand during inclement weather the storms break the telephone wires and, furthermore, the induced action of the transmission lines causes the conversation to become noisy.

2. Telephone lines installed on pole lines paralleling the transmission lines. This system has all the advantages of number one but is expensive in the first cost. It likewise is subject to the action of storms.

3. The use of toll lines of other companies. This method is also subject to all the advantages and disadvantages of the other two. Because of the many disadvantages upon separate telephone wire circuits is not considered as sure as to rely upon the more recent development of carrier current telephony.

4. Carrier current telephony, using the high voltage line conductors as carriers of high frequency waves. The disadvantages of this system are practically nil. The advantages of this type of voice contact are:—

Induced voltages from the transmission lines are drained off to the ground.

Absolute protection is provided against any chance of contact between the antenna wire (the wire used for inducing the radio impulses or currents into the high voltage line) and the power system.

The carrier current line is practically noiseless and communication can be carried on under conditions which cause wire telephony to become impossible. In the event of severe storms, the carrier current system is as reliable as the power line itself and though all the wires were down save one, normal communication could be carried on.

The initial cost and maintainance of such a carrier system are generally considerably below those of wire telephony.

Principle of Operation

In general, the system consists of a transmitter and a receiver at each station.

The transmitter consists of an oscillator, modulator and speech amplifier together with power supply similar in operation to the radio broadcasting transmitters. The receiver is identical with the ordinary radio receiver provided of course with a tuning range of wavelengths much greater than those found in ordinary broadcast or amateur receivers.

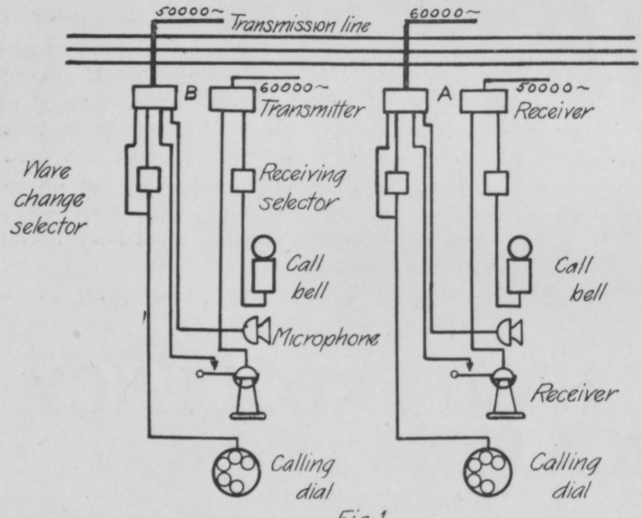


Fig. 1

The aforementioned apparatus, together with the antennae which are coupled near the transmission lines for a distance of from one half to two miles, form the elements of the system. There are also the usual telephonic appurtenances, desk stand set consisting of microphone transmitter and receiver, selective ringing devices, actuating devices and batteries. It may be noted here the difference between "wired wireless' and the ordinary space radio is in the fact that the former has a carrier wave to be guided along a desired path. Duplex telephony also differs from the commercial type telephone in that it uses no connected wire for communication between points. By duplex telephony is meant the carrying on of conversation simultaneously in both directions. This is brought about by transmission and reception on different frequencies. For example, station A. transmitts on 60,000 to station B. and station B. receives the signal on 60,000 cycles and transmitts on 50,000 cycles to station A. which station receives on 50,000 cycles (fig. 1.). In this way there is such a difference of frequency between transmitting and receiving stations that there is no conflict between them.

The essential parts of a complete intercommunication duplex telephone system might consist of the following:—

Transmitter	Protective Equipment
Receiver	Selectors
Rectifier	Desk telephone set
Balancing set	Telephone extension
The antennae	Power supply

The transmitter requires a source of direct current at about 2000 volts which is rectified before being used by means of rectifying tubes, chokes, filter condensers etc. All voltages are controlled by power rheostats.

The duplex communication is made possible by a balancing set permitting any station to tune for the carrier wave of the transmitting station and when once adjusted, need never be touched.

The operation of the entire mechanism is simple and need not require a technical expert to conduct two way communication.

A station is called by the removal of the receiver from the telephone hook, which causes a starting switch to close, connecting in the 110 volt cycle alternating current and supplying the filament voltage to the transmitting tubes through a transformer. The same current is passed into a step up transformer supplying power to the vacuum tube rectifiers which in turn rectify the current to 2000 volts D. C. for the plates of the transmitting tubes. By means of a dial switch the operator may cause a relay to close connecting in a howler transformer and causing the circuit to oscillate. Each periodic oscillation is modulated or non-modulated in the antenna as a high frequency current. Every receiver on this frequency responds by means of a selector, ringing a call bell. This bell continues to ring until the operator at the receiving end removes his receiver from the hook, which operation sets his transmitter in action in the manner described for the dispatcher's set. Immediately upon speaking into the microphone, the sounds enter the speech amplifier, and are passed on to the modulator, oscillator and finally to the antenna through the oscillation inductance.

Should a despatcher desire to call all stations on the lne, a combination on the dial causes all selectors to respond and relays at the various receiving stations operate all the call bells simultaneously.

It is thus apparent that communication between power stations uponheavily charged wires is duplex. In other words conversation may be carried on in both directions at the same time just as is done in ordinary wire telephone operation. While the principle sonsists of radio impulses guided along certain paths, the actual reception of every bit of conversation has been easily picked up by ordinary radio receivers at considerably lower frequencies and a mile or two away from the proximity of the carrier current antennae. The principles of guided frequencies are sound but their applications are broad and do not limit themselves to the fundamental ideas as originally brought out by the inventor. Just what may be the reason for this we will not attempt to say but we do know there is room for advancement in the development of duplex automatic high frequency telephony. It is not only a forward progress in the art of communication, but also a reliable and safe protective feature.

NEW EQUIPMENT FOR MECHANICAL LABORATORY

By Carl Wischmeyer, Professor of Mechanical Engineering

THE mechanical engineering laboratory will soon have several pieces of apparatus added to its equipment, chief of which will be a seventy-five horse power Sprague dyamometer. While this machine is designed particularly for testing automobile engines, it will prove useful for various other tests and power measurements.

The dyamometer consists of a seventy-five horsepower, two hundred fifty volt, shunt wound generator mounted in ball bearing pedestals. It is sa arranged that torque measurements can be made by means of a scale, with the generator running in either direction and with the torque exerted in either direction. That is to say, the machine may be used either as a generator absorbing the power output of the machine to be tested, or as a motor supplying power to the machine under test, and in either case the mechanical power is measured by the torque weighing scale. The shunt field is separately excited, so that by use of the field rheostat any speed up to four thousand revolutions per minute can be obtained.

When used for absorbing power, the energy is dissipated by resistance of the grid type. When used as a motor, the machine can be run at either 115 or 250 volts. The equipment includes a switchboard panel with necessary switches, field and armature resistances, ammeter, voltmeter, revolution counter and electric tachometer. It is also equipped with safety devices to guard against overload and over speed. In addition to the dynamometer proper, there is a slotted engine base, with four adjustable engine supports, by means of which the machine to be tested can be quickly connected to the dynamometer.

This type of machine is the one used by practically every automobile manufacturer for testing engines. Some manufacturers test each individual engine before it is built into the car. While the dynamometer is intended primarily for this purpose, it is readily adapted to tests of other machinery, such as electric motors or generators, gas and oil engines, fans, blowers, in fact practically any type of rotating machine. So far only one part of the dynamometer has been received, but it is hoped to have the machine assembled and ready for use by the first of the year.

Another addition to the equipment is a General Electric steam flow meter. This will be a permanent installation in the boiler room, and will give a continuous record of the amount of steam generated. It works on the well known principle of a differential pressure produced by placing a nozzle of restricted area in the pipe in which the steam flows. A measurement of this pressure difference gives an indication of the amount of steam flowing.

The indicating and recording part of this instrument is electrically operated. Variations in the rate of steam flow cause corresponding variations in the height of mercury in a U-tube. One side of the U-tube surrounds one side of the core of a transformer, and the mercury serves as a short-circuited secondary. The primary winding is supplied with 108 volt alternating current, the voltage being held constant by a special voltage regulator. The current taken by the primary will then vary with the height of the mercury, and an ammeter in the primary circuit indicates the rate of steam flow, and is calibrated to read in pounds per hour. The panel, which may be placed at any desired distance from the meter proper, carries the voltage regulator, the ammeter which indicates steam flow, a curve drawing ammeter which records the flow, and an integrating wattmeter which keeps a record of the total steam.

In addition to this meter, a small portable meter has also been purchased, working on the same principle, but without the electrically operated devices. Steam flow is read on this by noting the height of the mercury columns.

Another piece of apparatus is a portable, curve-drawing wattmeter. This is intended primarily for use in measuring the power output of our own power plant, but will of course be available for other alternating current measurements.

With the receipt of these new pieces of apparatus the mechanical engineering laboratory will be well equipped. There will still be some unoccupied floor space in the laboratory, where perhaps in the future a refrigerating machine and a Diesel engine may be added, but it must be remembered that the power plant, which is in a separate room, is part of the equipment of this department.

While We Think of It

Plans for the new dormitory which has been in the visionary stage for many months have been drawn up by Herbert Foltz '86 of Indianapolis, and have been accepted by the board of managers of the Institute. The detail plans are now in the process of formation and indications point to a completed "dorm" for the next school year. The materials and construction are to be in harmony with the architecture of the present main building. A site has been selected on the ridge east of the summer house so that the structure may be plainly visible from the National Highway.

Sounds good, men! What do you say?

And We Wonder

Early one Saturday morning the stage was set. Set, we say because it was all fixed. But that's only the beginning of the story—the brief follows.

Five hours in a stuffy bus—Purdue football field—game with a team we knew would beat us—score 44—0—dog tired—supper (and we paid out of our own pockets for all over a certain amount)—stuffy bus ride again for five hours—jeers from our own townsmen.

And they wonder why we don't have athletics at Rose!

YOUR MONKEY TRIAL

A review of the Address given by Professor C. C. Knipmeyer before a General Assembly at Rose

By W. R. Ferris, ee '27

CIVILIZED men sit around the mystery of electricity like so many monkeys around a dying fire! It is the mystery of electricity which appeals to most of its students. Without such mystery as this, the mysteries of the universe and of life itself would be solved. The mechanical engineer studies the law of gravity, measures its force, learns how to overcome its force, and makes it do his work and that of his fellow men, but he has no idea what it is. That everyday substance, matter itself, is as strange a mystery as electricity.

The reason for the great appeal of electricity to the civilized world is its wide adaptability. The radio brings to the farmer and his city brother, at the same instant, his choice of the day's drama, music, current events, and market reports. The electrical inventions for the home lighten woman's work so she can have more time for cultural thoughts. Our trains are rapidly being adapted to electric traction. Electro-chemistry gives us aluminum, calcium carbide, carborundum, fertilizers, explosives, and thousands of other everyday commodities. Medical science has been perfected through the X-ray, and electro-cautery and therapy. There is scarcely a single place where electricity cannot augment or replace methods adready in use. The application of electricity has been growing at such a rate that is has doubled every five years since the first electric light was invented.

Of course our immediate interest in electrical development is its opportunities for the engineer. We should first note what the main divisions of electrical engineering are. These can be roughly classified as power, transportation, communication, and the various industrial and special applications.

Power engineering begins with the generation of power. Here the engineer is needed to such an extent that without him we could have none of our super-power stations, with their possibilities of the production of cheaper power. A modern super-power station is a maze of detail, each part the work of engineers, and each unit working in perfect balance and under perfect control. The engineer alone has made this possible. Transmission of power after it is generated is another field demanding many engineers With the high voltages of today and the still higher ones of tomorrow, many new problems present themselves which the engineer must solve. Finally the local distribution of the power must be accomplished by the engineer.

Transportation engineering may be divided into groups relative to the distances to be covered. Naturally any such classification will overlap in its details but for convenience we divide the electric transportation systems as: street railways, electric traction, and the coming electrification of railroads and ocean going ships. Busses are often equipped with gas-electric drive on account of the greater flexibility which can be attained. The financial distress suffered by many of our large railroads, due to post war conditions, has kept them from electrifying their lines on account of the heavy cost of the experimental work which would be required. The finest battleships of today are using the electric drive because of its compactness and flexibility. Diesel-electric boats are supplanting the old type steam vessels because of the high efficiency of the Diesel engine and the flexibility of the electric drive. Electricity will transport every commodity used by civilized man in the near future.

Communication is probably the particular phase of the use of electricity which has received the most enthusiastic reception on the part of the American people. Our telephone system is so far developed that it can well be said that no home is complete without a telephone. Radio and the older land and marine telegraph furnish additional means of communication. Radio broadcasting has seized the country by storm. All these branches require large numbers of our engineers.

The industrial uses of electricity are so varied that only a few can be mentioned here. The electric motor is rapidily supplanting all other sources of motive power for factories. The reasons for this are the compactness, cheapness, safety, dependability, and simplicity of the motor and its connections, as compared to the awkwardness of belt drives for machinery. All lighting is now done with electricity, with rare exceptions. Electric heat is used in the various industries where extremely high temperatures and rapid heating are advantageous. Electro-chemistry and metallurgy are making enormous progress. All these things require engineers and will require them more than ever as they expand.

The electrical research man must first be an engineer of the highest type. He must then be a man interested in the pure sciences and have much patience and inventive genius. Our engineering schools furnish these men who expand the field of electricity.

Development and design require still a different type of engineer. He must also be of the highest type as must all engineers of today. He must have training and a certain inborn talent and genius to produce the electrical apparatus demanded by the other branches.

Manufacturinge of electrical products requir engineers with a business trend. Some of the biggest businesses of today are the electrical manufacturing companies and along with the manufacturing of the apparatus must be classed the sales department, for no business can operate without sales. The salesmen and sales managers for electrical manufacturing companies must practically be consulting engineers. They must know their products and all the applications of these products, which requires an intimate knowledge of every branch of engineering. The general engineering field may be said to relate to the sales branch in so far as it requires the same wide knowledge.

You young engineers are not to merely sit talking around the fire of knowledge. You are on trial; your friends, your families, the faculty of Rose, the public, and, finally, your own consciences are your judges. The General Electric Company has made an

(Continued on Page 25)

ENGINEERING IN CENTRAL AMERICA

Lest our views of engineering become constricted to developments in the United States alone, we print the following letter from C. H. Hunnell, formerly of the class of '27, and now located at Puerto Limon, Costa Rica, Central America. He was also a member of the Art staff of the Technic and from his letter it appears that he has not lost chance to draw a few pictures, even for the natives. He says,

Editor,
The Rose Technic,
Terre Haute, Indiana, U. S. A.
Dear Sir:

In compliance with a request made shortly before I left school last June, I will try to give you some idea of this part of the Latin American tropics. together with the nature of the work that confronts the engineer down here.

In the first place the popular conception that the republics of Central America are unstable in their governments, is wrong; although the Spanish Honduras and Nicaraugua still maintain the famous Saturday night revolutions wherein the liquor flows freely in place of blood and where a sober man with a sense of humor can become president over night.

But to return to the less colored life of the engineer in the tropics, Costa Rica, to be specific, is one of the most civilized republics in Central America. Her people are educated; her laws are just; and resources adequate. The population is pure Spanish with the exception of a few scattered tribes of Talamanca indians and some Jamaicans, I might add, are far better workers than the natives—due partly to their physical advantage and partly to the fact that an english speaking white man rates much higher with them than a Spaniard. For these reasons Jamaican labor will do much more work under english speaking engineers.

The Company here has a more or less permanent lease on the Costa Rica Northern Railway, a very modern system that takes care of all transportation in the republic. The company maintains an engineering department which in turn furnishes the engineers for the railroad. This engineering department has their headquarters in the interior at the foothills of the mountain range and is so located that it can place its force at any point in the republic with a minumum delay. Their headquarters is at Siquirres. The company is constantly building new extensions to the old line, adding tram systems to the present plantation extentions, and all of these must be kept up In all this work the engineering force is the controlling force, responsible only to the Chief Engineer. During the rainy season land slides and washouts form the chief amusement night and day. On such work one engineer is relieved by another until the work is finished, because it is essential that the fruit comes to the coast port of Limon and then to the States without delay. At times it is necessary to work all night, but in so doing lies the romance, what little there is. The whole thing is a system and it is necessary for each man to do his bit without grumbling at the extra hours and etc., If he cannot do this, he is respectfully requested to pack up and return to his starting place.

As for quarters and living conditions down here, there isn't much to be said. The company furnishes us with a house where a few fellows live, a cook, yard boy, house boy, and motor boy. You see labor being cheap, they can give us these added comforts. We have the best of furnishings, silver, and linen; our only personal expense being for board and laundry. A few of us join together and start a mess. We have a cook buy what supplies he wants, adding to it at times, and at the end of the month pay our share of the expense. Inasmuch as eating is our main diversion, we run the mess up into the Rolls Royce class, almost cutting our pay check in half

Each engineer is issued a motor car which runs on the rails, there being no roads down here. These cars can run at the average speed of from 45—60 miles per hour. We must get train orders from the despatcher before running on the main line, the same as any special or regular train. This is to prevent accidents, of course. Although we are stationed far from the coast towns, in these cars we manage to get down there every few days.

The climate of Costa Rica is very good in the "hills", but in the so called "tierre caliente", which is no more than cultivated swampland and virgin jungle, it is a different story. These "hot lands" are where the banana plantations are and where the malaria and blackwater fever sit enthroned. At present we are draining a large part of this land and it is slowly becoming healthier. Excellent hospital facilities also assist in keeping down the list of fatalities. When a man takes down, the company rushes him to the hospital even if it necessitates the ordering of a special train from Limon which is often done.

The jungles furnish excellent hunting grounds. We have opportunity to go hunting about every week and never fail to get game. This game consists of Jaguar, black tiger, deer, monkeys, wild pigs, and various smaller animals Birds are very abundent; snakes also add to the fun, although we hardly find time to go on "snake jaunts".

All in all it is a very pleasant experience down here and the chances for advancement are very good, although depending entirely upon the man's ability.

If a man takes care of himself in the tropics, there is no reason why he should not return to the north as healthy as when he came down, but if he does not intend looking after his health he had better stay away. As soon as the Company notices an employee losing his efficiency through non-observance of health rules, he is let out without any warning further than a perfunctory order.

In conclusion I would like to say that any one who has the idea that a man can come down here with a minimum of knowledge and draw a maximum of pay, is sadly mistaken. Men are coming here from all over the world and competition is very keen. This is especially true in engineering, due to the large number of English engineers. Unless a fellow is armed with a diploma, practical experience, and a keen sense of humor, he had better remain up there. The diploma is a symbol of the theoretical knowledge and although its lack can be covered up, it means the hardest way of doing a thing without it It also means sitting up at night trying to dope out a problem that with additional theoretical knowledge he could have solved in an hour. The practical side, or rather,

(Continued on Page 27)

'88

Mr. Edward G. Walters has moved to 1284 Mendell Avenue, Schnectady, N. Y.

'92

R. J. Wilson, '92, is now Manager of Works fr the Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa. Mr. Wilson's rise has been steady and consistent, and his position as Manager of the East Pittsburg plant of the Westinghouse Company stamps him as one of the leading engineering executives in the electrical field. Mr. Wilson has held his present position for several years, and has general charge of the principal plant of the Westinghouse Company, employing approximately 20,000 workmen.

'04

Mr. H. A. Millett is Assistant General Manager of the Yellow Cab Co. of Chicago.

'05

Mr. J. E. Dailey, (Pat) who suffered a serious accident to his back some months ago, is improving slowly. His address is 1226 Logan Avenue, Canton, Ohio.

'08

Mr. J. E. Bernhardt has moved to 310 West 66th. Street, Chicago, Ill.

Mr. G. H. Freers has moved to 5124 East Walnut Street, Indianapolis, Ind.

'10

Mr. A. A. Bareuther has gone to St. Louis as District Manager for Robert W. Hunt & Co. Address 1403 Syndicate Trust Building.

'11

Mr. D. W. Jones has moved to 306 North State Street, Christopher, Ill.

'15

Mr. Hugh Wallace and Miss Marjorie Taylor were married on September 8th. Mr. Wallace is treasurer and a partner in the Acme Coal & Lime Company.

'21

Mr. G. R. Armstrong attended the Rose—Evansville game on Saturday, Oct. 18th.

Mr. Milton H. Steffen has moved to 431 N. Menard Street, Chicago, Ill.

Mr. Jesse E. Dowen has moved to 431 N. Menard Avenue, Chicago, Ill.

'22

Mr. F. F. Hunt visited the Institute on October 7th. He is with the Link Belt Co. at Indianapolis.

Mr. W. C. Turner has moved to 7735 Haskins Avenue, Chicago.

Mr. Sterling Pittman and Miss Hariett Paige were married on September 1st.

'23

Mr. W. K. Boyd is with the Standard Oil Company at Bakersfield, California.

Mr. Morgan Wesley Jr. and Miss Josephine Koopman were married on August 25th. Mr. Wesley is with the Signal Mountain Cement Company of Chattanooga.

J. H. Rifenberg, '23 Electrical Engineering graduate, now on the graduate Student Course of the Westinghouse Electric & Manufacturing Company at East Pittsburg,Pa., will spend the next three months in the Engineering School of the Company. At its completion, he expects to enter the field of application of industrial heating.

'24

Mr. R. M. Schahfer and Mr. C. W. Simms were at the Rose— Evansville game on October 18th.

Mr. R. I. Graul is with the Pittsburg Transformer Company. Address Y. M. C. A., Box 603. Wood Street and 3rd. Ave.

'24

Mr. Leo J. Weir has moved to 27 Elizabeth Street, Hammond, Ind., where he is living with Schahfer, '24.

Mr. S. S. Forsythe (Sammie) is making a railroad survey at Lakeland, Florida. His address is 228 Hartsell Building.

Mr. L. F. Flaherty has been transferred to Washngton, D. C. by General Electric Co. He is working for them and studying law at George Washington University.

'25

Mr. D. C. McDargh, who is with the Highway Commission, has been transferred to Kingman Indiana. Address Box 201.

Mr. H. E. Schoonover is in Youngstown, Ohio. Address Y. M. C. A.

Mr. C. E. Moench is in the Maintenance Department of the Atlas Portland Cement Co. at Hannibal, Mo.

Mr. H. H. Merrill, C. A. Anderson, and W. R. McIntosh saw Rose play Evansville on October 18th.

Mr. Orville Dunning now has charge of the testing department for the new Radiola 20 with the General Electric Co., at Schnectady.

Mr. Charles C. Withrow (Fogarty) sailed on the 22nd. of October for Santo Domingo, Haiti. He is going to work on a railroad survey for some new company.

'28

Mr. G. H. Macnair is in Chicago. Address 4425 North Winchester Avenue.

Newton, ex '28 writes that he will be back in February to enter the second term freshman class. Mr. Newton was forced to withdraw last year because of illnss.

Boyd Fox, has been compelled to leave school on account of eye trouble. It is hoped that he will decide that 29 is as honorable as 28 and that his eyes will permit him to graduate in 1929

Dear Old Rose

For almost three-score years this Institute has sailed the billows of the engineering educational sea. "Bread has been cast upon the waters," and repeatedly it has returned to do her honor. Although some enthused member may arise, charging that old satire, "We killed the bear, but.....and etc"., we like best of all to place credit where credit is due.

Granting that each successful graduate from Rose Polytechnic possessed the hereditary tendency to become an engineer; granting that in his early life, environment played the role of engineer builder; granting all that, and yet there is only a balance struck in the scales of destiny. Once as a boy in mind he did not possess the tools of utility. He was once as helpless to motivate his life in one direction as a ship without a rudder. It was at that time, then, that he unconsciously began the long and tedious, but quite irresistable process of character building. In those early years of early manhood, when one feels at times hoplessly inconvenient, there was the subtle, yet sincere and strong guiding hand of Rose Polytechnic. Her faculty and her traditions, her students and that ever-prevailing atmosphere of Alma Mater have coalesced to give the engineering world men of character.

Search "Who's who" and find not just one, nor two, but many Rose graduates who have distinguished themselves in some outstanding way in their professions. Go out into real life and you will find Rose engineers with the reins in their hands because they are to be entrusted with genuine problems.

"The law of worthy life is fundamentally the law of strife. It is only through labor and painful effort, by grim energy and resolute courage that we move on to better things.

—Theodore Rosevelt

When Grad. '35 Cnmmences

Directly following the commencement exercises at the auditorium, the graduates betook themselves over to Freshman Hill and enjoyed a sumptious banquet in the dormitory dining room with the alumni who had journeyed back to ye olde campus. This homecoming had a real meaning to all who were present, for the campus was grown up. To hear the fellows talk of the recent ball game at Clark Field; the new additions to Faculty Row; shooting matches on Kerns Range; and the memories of Scrap Hollow four years past, made the pulse quicken and the feeling of accomplishment become more apparent. Part of the morning had been spent in looking over the improvements in the campus. The White Way, or approach walk to the building, with its new flank-lighting system was an inovation. Cedar Point, just behind Faculty Row, had still been preserved, and Welcome Oak in front of the main building also stood its ground like a sentenial who sees much: knows all.

The above extract from a theme upon the subject of campus tradition at Rose gives some very good suggestions for naming points of interest. No doubt there are several versions as to what the places mentioned should be called. By way of explanation, Faculty Row is just west of the drive, and Clark Field is the athletic field north of the school. The Technic goes on record as favoring a contest in order to establish names for the components of our campus.

ATHLETICS

Rose Nosed Out by Illinois Normal

In 1922 Eastern Illinois Normal defeated Rose Poly by a score of 7 to 0 in a football game at Charleston. On October 10 Normal defeated Rose by the same score.

It was a game full of thrills in which both teams threatened to score on several occasions, but the break in the game which gave the Illinois eleven a victory came late in the first period and the honor of scoring the winning touchdown went to Gilbert, right half of Eastern Illinois, while Cavins added a point on a drop kick in the try for point

Leake kicked off for Rose, and after a series of line bucks, Normal punted. An exchange of punts followed and a pass resulted in a 25 yard gain for the Teachers. This put the ball on the 17 yard line and a series of line bucks took the ball to the 3 yard line. Then Gilbert took the ball on third down and plunged through for the only touchdown of the game.

The kick off in the second half furnished the biggest thrill of the game when Mick Piper who had played an excellent game on defense caught the ball and raced through the field until only Cavins, the Normal quarterback remained between him and the goal. Cavins dived for Piper and caught one ankle with one hand. He could not hold on but it tripped Piper and he fell on the 35 yard line where the pursuing Normal players piled on him. Rose was forced to punt, and the ball changed hands numerous times, but with neither team having a chance to score.

The last period started with the ball in Normal's possession on Rose's 28 yard line. Cavins tried to drop-kick a field goal but White blocked the attempt and fell on the ball for Rose. Several passes were tried but failed and Leake punted. Normal tried another drop-kick which went wild, and the game ended as Leake gained 6 yards running from punt formation.

The play of the Rose end men, Bob Alexander and Dick Cole, was of a type that brought favorable comment of not only the Rose rooters, but of even the supporters of the Eastern Illinois team. These two end men broke up almost every attempt on the Teachers' backfield to gain in that direction. Normal's advantage was in its tackles which out-charged the Rose line men Andrews, who was sent in the game at the, start of the second half, played far better than any other Rose line man In the backfield Leake and Piper were the brilliant players of the day. Taggart and Reinking were closely watched and could not get started for gains. Brown played a good game at guard for Rose.

Line up and summary:

E. Illinois, 7.		Rose Poly., 0.
Hogue	L.E	Cole
Lee	L.T	L. Martin
Casey	L.G	Brown
Josserand	C	Kunz (Act. C)
Leamon	R.G	White
Rutledge	R.T	Aitken
Adams	R.E	Alexander
Cavins	Q.B	Leake
Smith	L.H	Reinking
Gilbert	R.H	Taggart
Strader	F.B	Piper

Engineers Fall Before Purdue

Outweighted by more than 20 pounds per man, Rose Poly met defeat in the game played with Purdue at the Ross Ade Stadium, October 17. The "Fighting Engineers" were true to their name and never quit fighting from start to finish, but Purdue's wide end runs and smashes were hard to stop, and weight and experience told the tale.

For Rose, the play of Alexander and Cole stood out above that of their team mates, and time and again they cracked the interference and brought down the giant Boilermakers. "Mick" Piper played a good game for Rose, as did Andrews and Kunz on the defensive play.

Most of the time Rose was on the defensive. Early in the game Purdue found the going hard, and at the end of the first quarter the Boilermakers led by the narrow margin of 3 to 0. "Cotton" Wilcox drop-kicked the ball over from the 18 yard line.

After the next kick-off Rose failed to gain, and Sweeney punted the ball 55 yards down the field, but Rose was penalized for holding and again Sweeney was forced to punt, this time from the 5 yard line. Wilcox returned the ball many yards by a brilliant broken field run, and after three plays Merkobrad scored the first touchdown for Purdue.

From then on, the breaks were against the Engineers and at the half the score stood Purdue, 16; Rose, 0.

A complete list of substitutions was made by Purdue at the start of the second half. It was Rose's ball, but Leichtle intercepted a pass and ran 35 yards for a touchdown. At this point the Engineers started to weaken and by use of unmerous substitutions, Purdue was able to pile up a final score of 44—0.

Rose played a clean game, being penalized 23 yards as compared with 103 yards for Purdue. Koransky, Wilcox, Smiley, and Hanneson were important cogs in Purdue's offensive.

Lineup and summary:

Purdue 44.		Rose 0.
Stillwell	L.E	Cole
Threfall	L.T	L. Martin
Spencer	L.G	Brown
Rabe	C	Kunz
D. Cunningham	R.G	White
Winkler	R.T	Andrews
Pillman	R.E	Alexander
Smiley	Q.B	Leake
Wilcox	L.B	Sweeney
Hanneson (C)	R.B	Taggart
Gladdens	F.B	Piper

Breaks Favor Evansville

Again history repeated itself and Evansville won on a fumble punt. The break came in the second period when Red Sweeney dropped a punt on Rose's 18 yard line and T. Rea scooped up the ball and ran for a touchdown that gave Evtnsville a 6 to 0 victory over the Engineers at Memorial Stadium on the afternoon of October 24. The same thing happened a year ago when Stuteville of Evansvile scooped up a fumbled punt and ran a few yards for the winning touchdown.

The game was fought on a muddy field and was a real battle. The teams carried the ball about an even number of yards from scrimmage but Rose gained much yardage by punting. At the start of the game Bakewell kicked off for Evansville. There were numerous exchanges of punts, and Sweeney out kicked Bakewell. Evansville was on the defense in this quarter.

In the second quarter numerous passes were tried, and Taggart missed a try at drop kick. Evansville intercepted a pass and an exchange of punts followed. Sweeney fumbled an Evansville punt and it was then that T. Rea grabbed the ball and ran for the only touchdown of the game.

The Engineers came back fighting in the third quarter and by a series of passes and line plays, brought the ball to Evansville's 3 yard line. But Evansville held and Rose lost the ball on downs. Garrett punted to Sweeney from behind the goal line, but Sweeney again fumbled, and T. Rea got the ball.

As darkness swept across the Stadium in the final quarter, the Fighting Engineers fought desperately for a score. Rose completely out-played Evansvile and twice carried the ball deep into Evansville territory, losing it once on the 15 yard line and once on the 16 yard line. Evansville had the ball across the center of the field once, and that was after a Rose pass was intercepted just a few minutes before the final gun.

During the game Rose Poly made five first downs and Evansville also made five first downs. It was a battle in which a team had to get a "break" to win and Evansville got that "break".

Lineup and summary:

ROSE, 0.		EVANSVILLE, 6.
Cole	L.E	Dunville
L. Martin	L.T	Wager
Aitken	L.G	Lang
Kunz	C	Eastwood
White	R.G	Willis
V.Martin	R.T	Roth, (C)
Andrews	R.E	T. Rea
Taggart (C)	Q.B	R. Rea
Leake	R.H	Volderaur
Sweeney	L.H	Southern
Piper	F.B	Bakewell

Rose Poly Bows to Butler

After Butler had piled up a score of 31 points in the first half, the Fighting Engineers came back in the last two periods of the game heid at Irwin Field on October 31, and battled their heavy opponents to a standstill. It was the pluckiest come-back ever staged by a team that had been completely out-classed in the first half. Butler scored a lone touchdown in the last half on a 20 yard run by Northam through the Rose line. Northam kicked goal making the final score 38 to 0 in favor of Butler.

Outside of that one touchdown, Butler did not come near to scoring in the second half. Sweeny's toe kept the ball rolling down the field in the final half, while Andrews and Curl went down under the punts in nice style. The Rose line in the final half stopped Butler's smashing line attacks and held the heavy Bulldogs to downs time and again. Sweeney made Rose's longest gain when he circled Butler's end for a gain of 15 yards.

After Butler had kicked off to Rose at the start of the game. Rose lost the ball on a fumble, and Butler marched down the field for the first touchdown. The second touchdown was similar to the first, Butler getting the ball by a fumble. Nipper made a run of 60 yards for the third touchdown and the period ended 19 to 0.

Nipper scored from the one yard line in the first play of the second quarter. Curl was sent in for Cole and Rose braced and fought hard. Then Nipper made a sensational 75 yard run with excellent interference and the half ended with the score Butler 31, Rose 0.

Then Rose registered a comeback and played Butler to a standstill. The Engineers played better than at any time this season, and the Rose forward line formed a stone wall which stopped Butler time and again. Piper and Leake played well in the backfield, while Andrews and Curl caused Butler plenty of trouble on the wings. For Butler, Nipper and Northam were the stars of the game.

Lineup and snmmary:

BUTLER, 38.		ROSE, 0.
Strole	L.E	Cole
Cecil	L.T	L. Martin
Pruitt	L.G	Aitken
Reichel, (C)	C	Kunz
Mullholland	R.G	White
Fletcher	R.T	V. Martin
Woodling	R.E	Andrews
Helton	Q.B	Taggart, (C)
Nipper	L.H	Sweeney
Collier	R.H	Leake
Miller	F.B	Piper

Benumbed Freshmen

Some one, not so long ago, called this the age of importunity and even ventured the remark that all men were guided by others. After all what did he mean? We can, at any rate, utilize his remark to observe the R. P. I. tendency.

Some one back in the medieval age of Rose instituted a custom which has been handed down and down. Let us hope that it will not go any further down, that its tradition be not dragged in the dust of uselessness. The custom is the disciplining of freshmen via the oak or pine board.

Paddling of a culprit for gross violation of a legitimate school tradition may be justifiable. Yes—Rosey was cruelly neglected and inhumanely left on the football field. Our elephant could hardly stand to see Rose athletics beaten, to say nothing of her torture by being left all alone. Somehow through all of it there is a mystery running yet. Why did the freshmen forsake Rosey?

It gouges pretty deep to say that the upper classmen were indirectly responsible. It ought also to hurt the freshmen pride to know that they were found wanting, for once. At any rate we want to know whether it was the overbearing attitude of the sophomore class or the backwardness on the part of the freshmen, that caused Rosey to be so deserted. The Technic boxes in the hall and "Y" room are waiting to receive the answer. The reasons or opinions of both upperclassmen and freshmen are solicited and the contributers' names will be kept confidential. Let's hear your opinions.

Something Worth Reading

Here is something we ran across the other day that we consider worth reading and remembering. It is a prayer written by someone who has the right principles of life.

"Teach me that sixty minutes make an hour, sixteen ounces one pound, and one hundred cents one dollar.

Help me to live so that I can lie down each night with a clear conscience, without a gun under my pillow and unhaunted by the faces of those to whom I have brought pain.

Grant, I beseach Thee, that I may earn my meal ticket on the square, and that in doing thereof that I may not stick the gaff where it does not belong.

Deaden me to the jingle of tainted money and the rustle of unholy skirts.

Blind me to the faults of the other fellow,but reveal to me my own.

Guide me so that each night when I look across the table at my wife, who has been a blessing to me, I will have nothing to conceal.

Keep me young enough to laugh with my children and to loose myself in their play.

And then when comes the smell of flowers and the tread of soft steps, and the crunching of the hearse's wheels in the gravel out in front of my place, make the ceremony short and the epitaph simple:

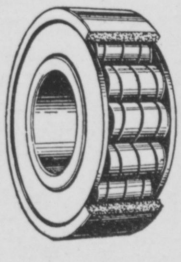
"Here lies a Man".

Columbus was a man of vision

BUT not even he could have foreseen the great industrial development of this country which would come about through improved methods of manufacture and transportation, and the important part that would be played by Hyatt roller bearings.

Modern industry requires and far sighted engineers demand that rotating parts be mounted on bearings that will roll instead of rub.

Raw silk, wool and cotton are transformed into the fruit of the loom; deeply hidden coal and metal ores are brought to the light; ribs of steel are fabricated for the backbone of modern construction. In fact every phase of industry is speeded up and assured uninterrupted output by the use of Hyatt roller bearings which, with their rugged durability and unfailing dependability are serving the needs of the nation faithfully and well.



When designing or purchasing mechanical equipment, remember that the combined experience of the Hyatt Roller Bearing Company's engineers and specialists is always at your disposal to help you solve your bearing problems.

HYATT

Roller Bearings

An actual Hyatt bearing, nickel plated for use as a paper weight or pocket piece, is yours for the asking. This bearing, the smallest we manufacture, clearly demonstrates the anti-friction principle which has made Hyatt bearings leaders in the commercial world.

HYATT ROLLER BEARING COMPANY, NEWARK, N. J.

FRATERNITIES

ALPHA CHI SIGMA

The October professional meeting, held October 5, proved to be quite instructive and educational to both members and pledges of Iota chapter. Dr. John White, head of the department of chemical engineergni, and Professor Rauth, instructor in electrical measurements, were guests of the fraternity. Dr. White gave an illuminating talk and resume on the subject, "The Selection of a Career." The mechanics of profession selection, together with the importance of personal initiative were stressed. Professor Rauth's talk was on "The Relation of Electricity to Chemistry". Modern contacts of chemistry and elctricity in both commercial and laboratory work were discussed in a very interesting manner.

An enjoyable Hallowe'en party was held October 30, at the fraternity's new home on Chestnut street. The house was appropriately decorated with fruits of the autumn season, and the hostess, Mrs. Russell Corban, had arranged several dainty surprises and favors. Novel stunts and tricks kept the interest high throughout the evening's program. Old fashioned pumpkin pie with sandwiches and coffee completed the menu and the revelers broke camp at a late hour.

ALPHA TAU OMEGA

Gamma Gamma is pleased to announce the formal initiation of pledges Alexander and King on Monday evening, October 26.

Brothers Hall and Neely of the Indiana Delta Alpha are frequent visitors at our chapter. McIntosh and Anderson, '25, of this chapter returned for the Rose-Evansville game and the Rose Hop. Both are very well satisfied with their work, but they were glad to get back with the chapter for a while.

Plans are being made for a big dinner and smoker at the house in the near future.

Gamma Gamma announces the marriage of two former brothers; Robert T. Hendrick, '23, to Miss Marie Hahn of Cleveland, Ohio, and Frank A. Ranahan to Miss Martha B. Manson of Terre Haute, Indiana.

SIGMA NU

Beta Upsilon wishes to announce the initiation of William Houston on October 2, 1925.

On Friday, October 30, and Saturday, October 31, Beta Upsilon moved her belongings from the former house at 1441 South Sixth to the location at 665 Mulberry Street. With a gravel dump truck procured by brother Pickel, and several of the thirteen dollar Fords, we exemplified the "Move yourself" idea. Being Engineers, we had little trouble in mastering the art of the moving-van-hand. The climax of the moving party came when we moved the piano. Using little brains and all of the accessible brawn, we showed our musical inclinations by successfully carrying a tune. In fact we not only carried a tune but we even transported it for a distance of about two miles. It also tended to set the inhabitants agog when they saw and heard a musical gravel truck.

The first house-warming affair will be held on Tuesday evening, November 24, 1925. One of the old alumni and chapter meetings will be held in which things are going to happen, and things are going to be done.

Hallowe'en was ushered in by the chapter in the way of a hard time dance on Thursday evening, October 29, 1925. Not a chance to bring out the hard time idea was forgotten, and the result was a real, honest, and truly hard time affair. In the first place those dressed in their hard time costumes had a hard time in getting safely to and fro, particular those brothers who were old-fashioned enough to use a horse and rig as a mode of transportation. Then in the dance proper, the evils of the goblins and spooks were driven away by the brothers striving hard to master the "Charleston" to the orchestra's "Hard Time" rhythm. Pumpkins, nestled amongst the corn-stalks, smiled and frowned upon the participants as they completed the true Halowe'en spirit by their inquiries of "Witch dance is mine." Immediatey after the pumpkin pie and coffee was served, the Sigma Nu vocal chorus gave its customary recital of the fraternity songs. That ended the lives of the spooks as they were then driven away for good. The dance was then resumed without fear until the first wee hour of the morning.

Interest in the Twenty-second Grand Chapter Meeting at West Baden December 30, 31, and January 1, is reigning at a high pitch, and seems to be mounting. Great things are being planned and we intend to have a 100% representation. Every kind of locomotion evident around the chapter is being tuned up for the trip, as the event promises to be a great one.

THETA KAPPA NU

At Indianapolis, November 30, December 1, and 2, 1925, Theta Kappa Nu will hold its first annual convention. Although this is but the first of these conventions, the entire United States will be represented when the some thirty odd chapters assemble at Indianapolis for the convention. Theta Kappa Nu is principally made up of old local fraternities whose group life was generally concentrated about one locality. For this reason the meeting is to create a closer union between the chapters covering the entire United States. Messrs. Max Sherwood, and Ray Davis will officially represent Indiana Gamma, but it is expected that the entire chapter will get over to the big city some time before the end of the session.

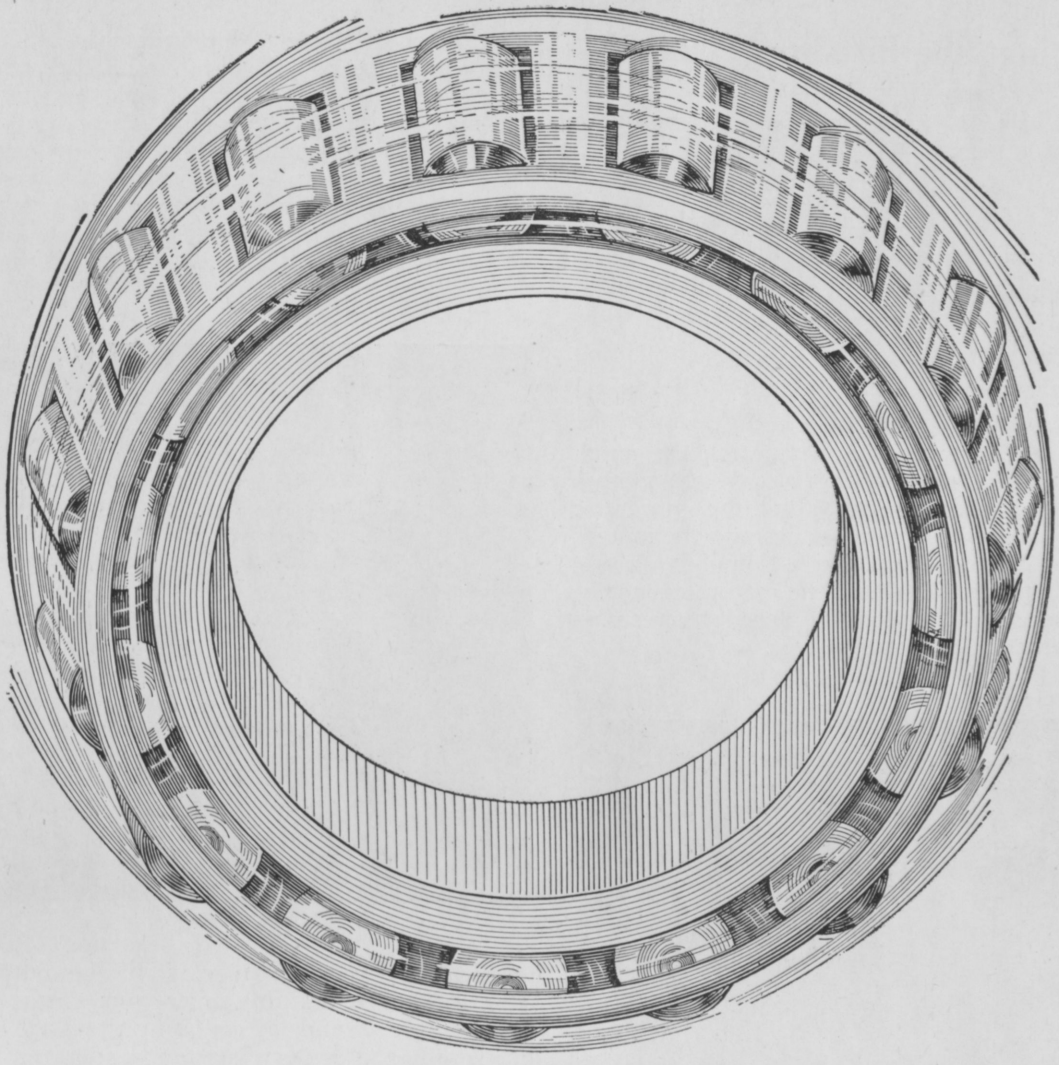
Harold Carson writes from Florida that he is doing nicely with a Civil Engneering Company.

Indiana Gamma is holding its Annual Turkey Run dinner dance on November 7, 1925. This affair is looked forward to from year to year, by the alumni as well as the active members. Ada Cambell and her serenaders will furnish the toe initiative for the event.

THETA XI

Kappa of Theta Xi held a costume Hallowe'en dance on October 29 at the Edgewood Grove community hall. Music for the evening was furnished by Jack O'Grady's "Varsity Seranaders." The guests included Lt. and Mrs. Wm. Bessell, Lee Pickel, Richard Cole, Harry Shewmaker, and Joe Dreher.

(Continued on Page 27)



IN little more than a quarter century, the manufacture of Timken Bearings has become by far the greatest bearing industry. A daily capacity of 125,000 bearings is required of Timken plants in the United States, Great Britain and France. The total of Timken Bearings built has reached 150,000,000! And Timken Bearings are being ever more nearly universally applied to machinery of all kinds, to rolling stock, and to motor vehicles.

Indeed, in many instances, the use of anti-friction bearings first became possible only because of the special characteristics of Timken Bearings.

The progress of industry toward a scientifically economic basis throughout will be in your hands. And Timken Bearings are playing an ever larger part in industrial economics. The reasons are interestingly outlined in the little stiff-bound book, "The Design of the Timken Bearing." You may have a copy upon request.

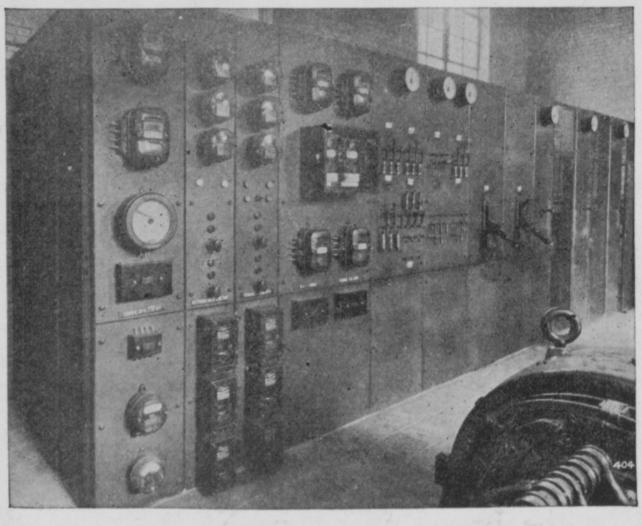
THE TIMKEN ROLLER BEARING CO.
C A N T O N , O H I O

Ventilating The Pittsburg Tunnel

(Continued from Page 5)

motors jointly up to 2½ times full speed. Interlocking devices are provided so that the speed cannot be increased above double speed until both motors are brought to this speed and the clutches closed, putting both motors on the fan, after which the speed may be brought up to the maximum of 2½ times full speed.

The control is so arranged and interlocked that either motor may be started and its magnetic clutch closed to operate the fan but the clutch of the second motor cannot be closed until it is brought up to the same speed as the first motor, at which time the clutch of the second motor may be closed and both motors used to drive the fan. At this point the concentric rheostats may be brought into service and the motors brought up to 2½ times full speed. Complete electric interlocking is provided so that the motors cannot be overloaded nor can a clutch be closed between an operating motor and a motor at rest.

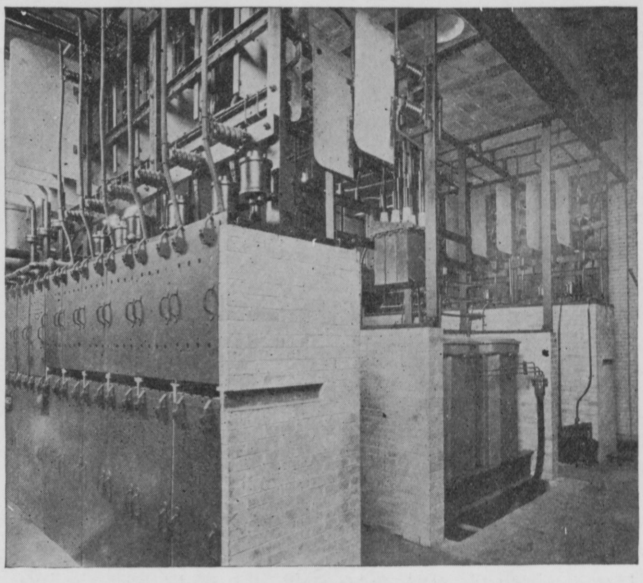


Lighting of the Tunnel

The tunnel must be lighted continuously, and this is provided by the use of 250 candle-power, 6.6 ampere series incandescent lamps (with film cutouts) spaced at 50 ft. intervals throughout the length of the tunnel, and equipped with regulation street reflectors. Current is supplied to the tunnel lamps and to the approach lights by means of four series circuits. Each circuit has its own constant-current transformer which connects it to the 2200 volt switchboard. Two circuits serve the north ends of both tubes and north approach and two serve the south ends of both tubes and south approach. Each circuit is connected to alternate light outlets so that if, for any reason, one circuit becomes inoperative, only 50 percent of the lights will fail.

Traffic Conditions

For a number of months, before the completion of the ventilation system, the tunnel was operated, with limited traffic, under natural ventilation. Since the ventilation system has been in operation, no attempt has been made to limit the spacing of cars or control their method of operation except such control of speeding and reckless driving as the traffic police men may exercise. The maintenance men or traffic policemen can communicate with the operating room by telephone, at any one of the cross passages between the two tubes, such passages being spaced about 500 ft along the tunnel. However, the operators depend largely on the indications of the carbon



monoxide recorder and increase the fan output whenever the curve indicates over four parts in 10 000. The present practice of operating the plant is to keep one supply and one exhaust fan in operation throughout the twenty-four hours for each tube and to use all fans only during the day, the speeds of all fans being regulated according to traffic conditions, the speed being increased just before rush hours so as to maintain ample ventilation during the traffic peak. Overhead operation by switching in the second motor of each fan is resorted to only at times of congestion or similar emergency. There is no unnecessary duplication of equipment. Only such duplication is provided as is necessary to secure the continuous operation, so vitally necessary to the safety of the public, and to provide for operating the plant at maximum efficiency.

Super Vision

(Continued from Page 7)

was that it actually worked! Within four months, we were able to improve the quality of the product, as measured by a certain idealistic and arbitrary set of standards purposely established far above regular commercial requirements, from a point where check inspections of the finished product, boxed, ready for shipment, showed 92% passed as perfect against a previous 70%. In lamp making, that is considered a very real achievement.

Now, granting that supervision is a big part of manufacturing, it is also obvious that it is a very large part of any form of administration whether commercial, industrial, political or educational. Supervision, according to Webster, has to do with overseeing, or in other words, seeing over, seeing farthef, seeing **more clearly.** Supervision means just what those two words mean—Super-vision. Superlative vision.

Now, if we accept the reality of supervision, we simultaneously accept the reality of average vision and less than average vision which brings us with a crash to the proposition that, all statements to the contrary notwithstanding, all men are not created equal and neither do they grow to be equal. Surely, all men should receive equal justice. I think that is the real meaning of that statement in the Declaration of Independence, but we all know from our commonest experiences that there is a wide range of capacities and abilities in individuals. And that being true, probably quite properly, and certainly most naturly, those who posses the most capacity and ability arrive finally at dominant positions. Thus we have, as we have always had, a ruling class. I think we will always have a ruling class, whether we like it or not, whether we approve of it or not. At least, we will have a ruling class until human nature experiences a vast change. That, however, is in itself no cause for alarm. It may alarm and irritate those who have communistic notions and ideas of a pinkish tinge for as nearly as I can understand, it is the belief of such people that the world's work can be carried out just as well by the weak, the uneducated, the illiterate, the ignorant and the stupid as by the wise, the strong, the intelligent and the educated. If that is true, we had best burn down our colleges and universities today, for if that is true, their work is not needed.

I say, the fact that we have and will continue to have a ruling class is in itself no cause for alarm. But there is one thing which we should consider solemnly, seriously, thoughtfully. If all of us are to progress and prosper and have a measure of happiness, it is absolutely essential that the ruling class be wise and just and capable in short, truly educated both mentally and morally. And, in the last analysis, that this end may be accomplished is the work of all proper and constructive educational institutions.

That, of necessity, must be their aim since where are the **majority** of tomorrow's leaders save in the college classrooms of today? This brings us to the matter of the responsibilities of the educated. I want to repeat that phrase—the responsibilities of the educated. Responsibility is a word to conjure with. To quote Elbert Hubbard just once more. "To act with absolute freedom, and at the same time appreciate that responsibility is the price of freedom, is salvation." In other words, the great rewards of life are only purchased through responsibilities properly assumed and properly discharged.

Now, why have you and I been educated—academically educated? Why are the individual states of our country spending millions of dollars annually on education? Why are philanthropists of vision giving millions of dollars each year to the cause of education? Is it in order that men like you and I who partake of that education may live in a little greater prosperity; that we may wear somewhat better clothes than we otherwise could; that we may own cars and go on summer vacations? I do not think so. Education is for the betterment of the community, the state, the nation—the betterment of humanity!

I have a great sympathy and admiration for all constructive educators whether they be college professors, honest salesmen, or manufacturing plant executives. To some of you who have not thought along these lines before, it may seem rather unusual that there are other educators than class room educators. But that one may be an educator depends not so much upon one's position in life, or one's vocation as it is a matter of attitude. This reminds me that some years ago there was at the head of the National Lamp Works, before it was purchased by the General Electric Company, a man who must have had the attitude of an educator. He is remembered today in our company by one of his favorite expressions, "I would rather make men than money!" Today, in the office of every divisional manufacturing plant manager and every district sales manager, you will find a plaque bearing that inscription. It is a fine expression. It is a good thing to see and think about now and then. It is not only a good thing in those places where one now finds it, but it could also be well placed in all our universities and colleges and schools of learning, for it is the true expression of all true professors and teachers. "I would rather make men than money."

And so to you young men who are now leaving the classroom, I would urge that you remember that you carry a responsibility—the responsibility of the educated. an obligation to yourself, an obligation to your parents who have sacrificed that you may be educated, an obligation to the community, and an obligation to yor professors who have labored with you and given of their efforts that you too may join the army of educators.

But if I were you, I would not regard the passing of your college days with sadness, but rather with gladness, for life is only now closing the curtain of the prologue. You will find many wonderful things that await you even though they must be understood to be appreciated. Life is filled with high and terrible tragedy—Yes; But it is also filled with high and brilliant comedy; with stirring romance and with splendid drama. And if you would find those things, you have but to seek them since if you seek anything with sufficient diligence you shall find it, **which** truth caused one man to say, "Beware of that which you most desire, for it will surely come to you." And if you seek, then you will find, so that in the end you shall learn how to develop within yourselves that you may put into your work—and that is what realy counts—that you may put into your work—really counts—that you may put into your work—a Product and a Man to make good!

With The Tech Clubs

The New York Rose Tech Club met at dinner at the Engineers' Club in New York City on Friday evening, October 23rd. President Wagner was the guest of the Club and gave a talk upon the changes which have taken place at the Institute during the past two years, and the outlook for the future. He emphasized the purpose of the Faculty to hold up the scholastic standard, making a diploma from the Institute mean as much as it did when those present graduated. He also referred to the project of building a dormitory upon the school campus, and the hope that this would bring about a better school spirit and also be attractive to non-resident students.

New officers were elected in place of William H. Boehm, class of '91 and Henry C. Schwable, class of '99, who had served as president and secretary respectfuly for a number of years. Mr William S. Menden, class of '91 was elected the new president and Ed. J. Hegarty, class of '15 was elected secretary. Those present included Wallace P. Andrich, '07; William H. Boehm, '91; Edward J. Hegarty, '15; John E. Hubbell, '98; Francis W. Hurlburt,'91; George A. Kellsal, '06; Cliff B. Keyes, '99; William S. Menden, '91; Harry C. Uhl, '12; Walter L. Uhl; '08; Walter W. Eilison, '08.

The "Y" Inagurates

It is only a matter of history when several men of the freshmen class drop out near the beginning of the school year, but when the percentage of those leaving, increases beyond past values we look about for the reason. The age of the present members of the freshman class is apparently below the average, and still such a reason does not seem adequate.

The Y. M. C. A. has sensed something and has organized discussion groups to see if the fault does not lie primarily with the upperclassmen because of their neglect to lend a hand to the new men in school. There may be other views on the matter which comes up for general discussion in the open meetings throughout November. Freshmen and upperclassmen should attend such discussions and help to clear up a befogged issue.

Your Monkey Trial

(Continued from Page 10)

honor roll, including the names of all the men who had gained distinction in their organization and of all the colleges whose graduates are represented. Rose stands third in actual number represented. In proporation to the size of the school, Rose is represented first by an enormous majority. The final verdict in your trial will be the extent to which you make good, and this will be the measure of the satisfaction you will get from life.

Library Notes

The library of the Institute recently received a copy of a pamphlet entitled, "Velocity of Sound in Sea Water ", which represents the results of research carried on by the U. S. Coast and Geodetic Survey. Conspicuous in the research is the work of Jerry H. Service '12 who is a lieutenant stationed on the S. S. Guide from which most of the experiments were conducted. The principle problem involved the determination of the relative effects of temperature, pressure, and salinity upon the velocity of sound. Service, is a junior hydrographic engineer, and was selected for the work because of previous experience in physical research.

Fraternities

(Continued from Page 20)

Brothers Junker, Armstrong, Boyd, Bales, and Merrill have been back for short visits at the house.

Several Kappa men made their way by one means or another to the Purdue—Rose football game a few weeks ago. After the game, all attended a dinner at the Theta chapter house.

Kappa has begun a system of self-education which is proving to be a success. Each Tuesday, some local business man is invited to have dinner and spend the evening at the house. This helps to develop an interest in affairs outside of the ordinary school scope, and also helps the guests to observe fraternity life at close range.

Engineering In Central America

(Continued from Page 11)

lack of it cannot be covered up. The green man must get it; and down here the green man, although not much in evidence, always gets credit for his inexperience. A little practical work before coming down adds much to his prestige after arrival. Sense of humor is a necessity in dealing with these Jamicans and natives else a man would go crazy. They not only must be told to do a thing, but must be shown and have a few pictures drawn besides. Then after it is all done you find that they have misunderstood what you told them. Furthermore, one must be able to see the humor of waking up in the mornnig only to find your clothes full of ants, your cigarettes stolen by the house boy, and your breakfast nil, due to the enexplained absence of the cook. And so it goes.

Fellowships In French Universities

Attention has been recently drawn to the eleven scholarships which are being offered to American college graduates for graduate work in various French universities for the year 1926-27. These scholarships, offered by the American Field Service, are for a three-fold purpose:

1. To provide an enduring memorial for the 127 Field Service men who gave their lives in the great war.

2. To develop a better realization and appreciation of the contributions of French Universities to science and learning.

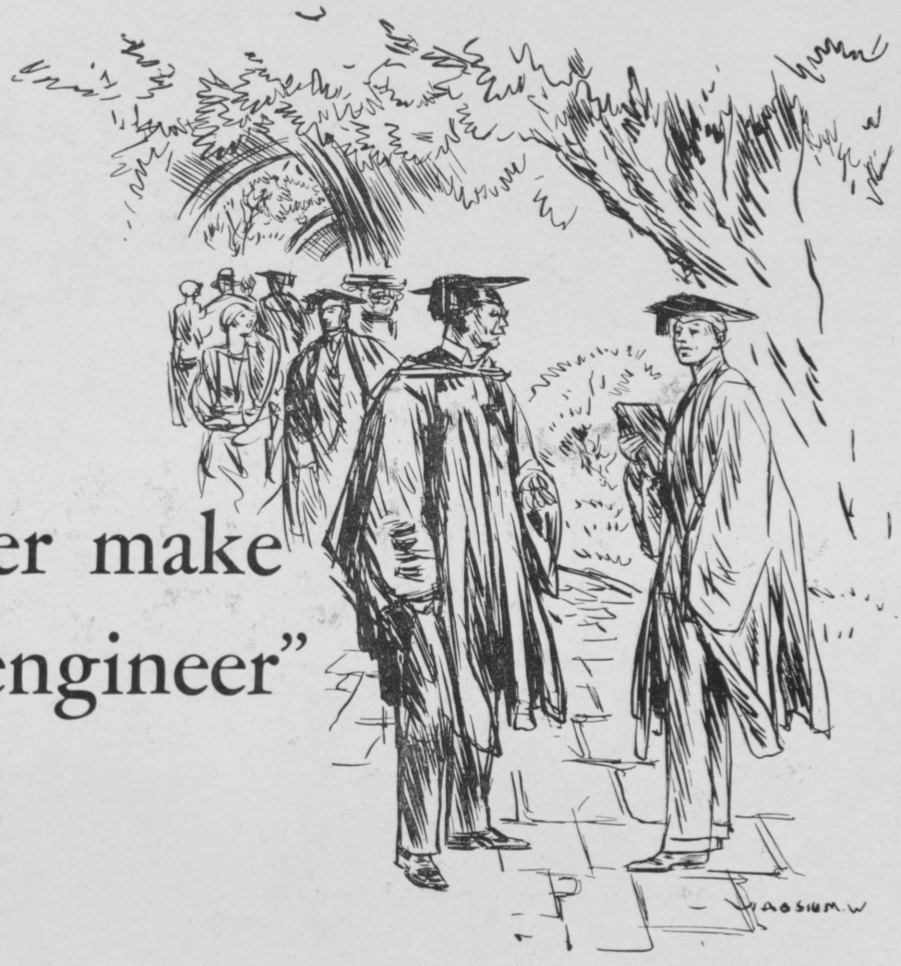
3. To promote mutual understanding and goodwill between the United States and France.

These scholarships are each of the value of $1,200 and tenable for one year. They are renewable for a second year upon application, provided accomplishments warrant it. Many fields of study are available, but selection should be made of those subjects in which previous work has been done either in college or commercial pursuits subsequent to graduation. Fellows are not held responsible for any specific achievements in their particular courses.

A candidate to be elligible for a fellowship must be a citizen of the United States and from twenty to thirty years of age. He must, furthermore, have the practical ability to use french books, both in general subjects and in his special field.

His must, at the time of application, be a graduate of a college of recognized standing, or of a professional school requiring three years of study for a degree.

The announcement of these scholarships should prove of interest to all Rose graduates who are anticipating further school training. To the "pure science" investigator, the technician and engineer who wishes to broaden his vision in his particular field. such awards should prove of interest. It is hoped that alumni will seize upon this opportunity to obtain foreign training and write or apply to Dr. John White for further information.



"You'll never make an electrical engineer"

Carl Taylor

SO a blond young man named Taylor, just graduating in electrical engineering at the University of North Carolina, was advised by a conscientious professor. The professor's conviction was based on quiz papers and was amply justified. But the young man was not discouraged; he had other hopes, he said. Today—ten years later—he occupies a peculiarly important position with the Westinghouse Company.

Before Carl Taylor had completed his apprenticeship with Westinghouse he began to sell apparatus to utility-customers. He had previously sold clothing in college. He had selected an electrical engineering course because he believed the industry promising for men of selling interests.

His first actual order—the electrification of a scrap yard—was awarded to him at a higher price than that asked by any other bidder because he had "lived with" the job and given all the service this implies.

Some months later the Company was surprised at a request from him for an indefinite leave of absence. He wanted to take a job with a manufacturer of steel mill machinery, in order better to understand the problems of such users of electrical equipment. His leave lasted two years. He returned from the superintendency of a well-known plant—returned at a lower salary than the superintendency had paid him. But within three years he was manager of the industrial division of the Pittsburgh Sales Office—the largest division of the Westinghouse Company in the entire country. Today he has a sales organization of sixty-five men.

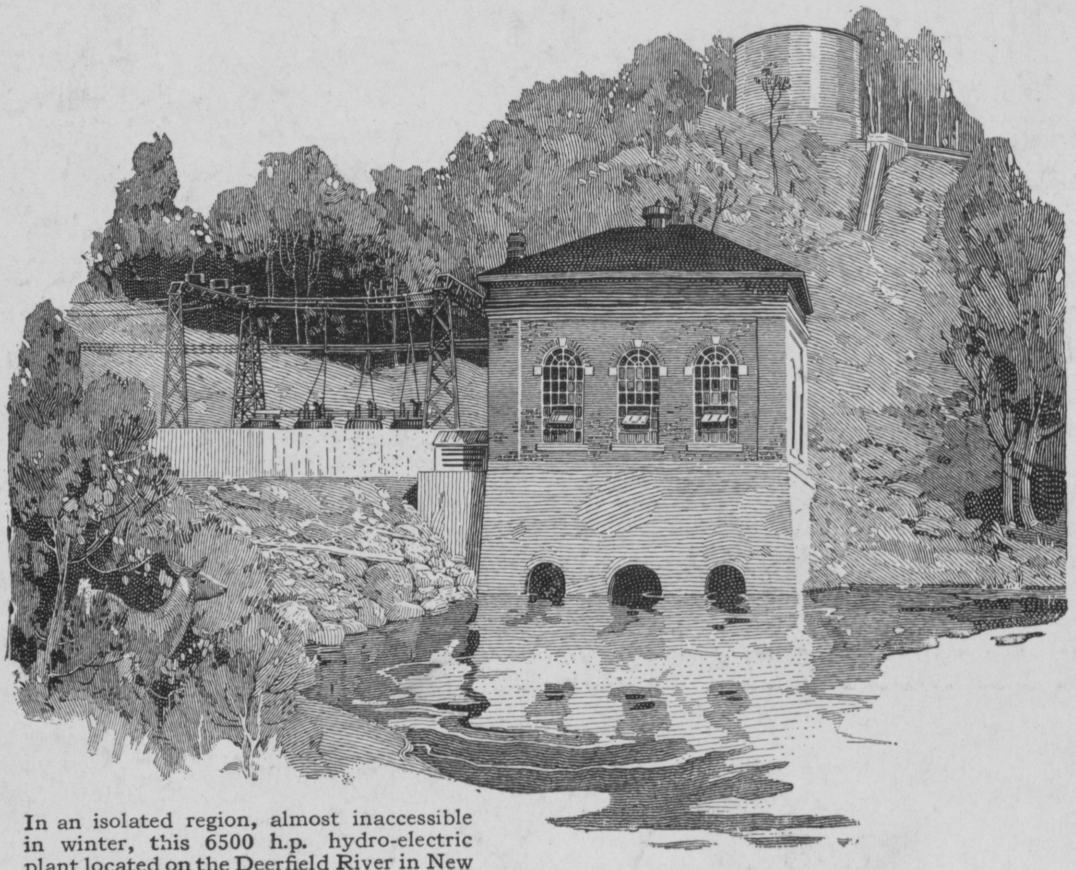
To get the customer's point of view—to go the limit to anticipate his wants and keep him satisfied—this is the Westinghouse sales policy. It is the policy of all enlightened industrial organizations. Men who can exemplify it in their personal careers need have no question about their futures.

The question is asked: Where do young men get when they enter a large industrial organization? Have they opportunity to exercise creative talents? Or are they forced into narrow grooves?

This series of advertisements throws light on these questions. Each advertisement takes up the record of a college man who came to Westinghouse within the last ten years, immediately after graduation.

Westinghouse

WESTINGHOUSE ELECTRIC



In an isolated region, almost inaccessible in winter, this 6500 h.p. hydro-electric plant located on the Deerfield River in New England, starts, protects, and stops itself.

A Self-Starting Power Plant

Dawn—the slumbering city awakens and calls for electric current. Many miles away the call is answered. A penstock opens automatically, releasing impounded waters; a water turbine goes to work, driving a generator; and electric current is soon flowing through wires over the many miles to the city. This plant starts and runs itself.

Power plants with automatic control are now installed on isolated mountain streams. Starting and stopping, generating to a set capacity, shutting down for hot bearings and windings, gauging available water supply, they run themselves with uncanny precision.

Thus another milestone has been reached in the generation of electric power. And with present-day achievements in power transmission, electricity generated anywhere may be applied everywhere.

The non-technical graduate need not know *where* electricity comes from—nor even *how* it works. But he should know *what* electricity can do for him no matter what vocation he selects.

The General Electric Company has developed generating and transmitting equipment step by step with the demand for electric power. Already electricity at 220,000 volts is transmitted over a distance of 270 miles. And G-E engineers, ever looking forward, are now experimenting with voltages exceeding a million.

A new series of G-E advertisements showing what electricity is doing in many fields will be sent on request. Ask for booklet GEK-1.

3-10DH

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YORK